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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/789,371	02/26/2004	Jens-Peter Dittrich	13911-104001 / 2004P00004	5134
32864	7590	09/05/2006	EXAMINER	
FISH & RICHARDSON, P.C. PO BOX 1022 MINNEAPOLIS, MN 55440-1022			LIE, ANGELA M	
			ART UNIT	PAPER NUMBER
			2163	

DATE MAILED: 09/05/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/789,371

Applicant(s)

DITTRICH ET AL.

Examiner

Angela M. Lie

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 26 February 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-9, 12-17 and 20 is/are rejected.
- 7) ☒ Claim(s) 10, 11, 18 and 19 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 6/21/2004.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Claim Objections*

1. Claim 7 is objected to because of the following informalities:  
  
The purpose of flag fd is unclear.
2. Appropriate correction is required.

### *Claim Rejections - 35 USC § 112*

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:  
  
The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
4. Claims 1 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
5. The term "pairs" in claim 1 is a relative term which renders the claim indefinite. The term "pairs" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. The examiner is not certain which pairs of partial keys are taken into account. It has to be clearly defined which partial keys are compared.
6. Note that for the purposes of the examination, it is considered that any of the keys are compared or matched.

***Claim Rejections - 35 USC § 101***

7. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

8. Claims 1-11 and 20 are rejected under 35 U.S.C. 101 because the claimed invention lacks patentable utility. In the independent claims 1 and 20, the result is based on the "if" condition in which columns have to have functional dependency in order to lead to the concrete result (i.e. eliminating corresponding columns). However, if those columns are not dependent, then there is no useful result.
9. Claims 2-11 dependent on claim 1 also fail to disclose useful result.

***Claim Rejections - 35 USC § 103***

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 1, 12 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schiefer et al (US Patent 5761653) in the view of Witkowski et al (US Publication 2004/0034616).

As to claims 1 and 20, Schiefer teaches a computer implemented method and apparatus for reducing redundancy within a data model in a database (column 3, lines

19-24), wherein the data model is represented by at least one table (column 3, lines 46-48), the method comprising: determining a number of distinct values of partial keys in a table (column 5, lines 47-52), wherein each partial key represents at least one row in the table; determining whether pairs of partial keys are functionally dependent (column 8, lines 1-8); and eliminating one or more columns having functional dependencies from the table (column 9, lines 39-44). Schiefer does not teach reordering one or more columns based on the cardinality of partial keys or he does not explicitly teach the structure of the table as disclosed in further claims, however Witkowski clearly teaches the tables comprising partial and figure keys and he also teaches managing relational databases wherein the tables are ordered based on their cardinality (paragraphs 516 and 517). It would have been obvious to one of the ordinary skill in the art during the time the invention was made to order the columns according to their cardinality as taught by Witkowski, in Schiefer's relational database, because ordering the columns based on their cardinality allows to improve compression ratio (i.e. more efficient memory management).

As to claim 12, Schiefer teaches a computer implemented method and apparatus for reducing redundancy within a data model in a database (column 3, lines 19-24), wherein the data model is represented by at least one table (column 3, lines 46-48), the method comprising: determining a number of distinct values of partial keys in a table (column 5, lines 47-52), wherein each partial key represents at least one row in the table; determining whether pairs of partial keys are functionally dependent (column 8, lines 1-8); and eliminating one or more columns having functional dependencies from

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the table (column 9, lines 39-44); and creating an exception list for the pairs of partial keys that are not functionally dependent (column 9, lines 39-44, wherein the list is the catalog of the columns that were not deleted sine they were not functionally dependent). Schiefer does not teach reordering one or more columns based on the cardinality of partial keys. Witkowski teaches managing relational databases wherein the tables are ordered based on the cardinality (paragraphs 516 and 517). It would have been obvious to one of the ordinary skill in the art during the time the invention was made to order the columns according to their cardinality as taught by Witkowski, in Schiefer's relational database, because ordering the columns based on their cardinality allows to improve compression ratio (i.e. more efficient memory management).

12. Claims 2-9 and 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schiefer et al (US Patent 5761653) in the view of Witkowski et al (US Publication 2004/0034616) and further in view of White et al (US Patent 5918225).

As to claim 2, Schiefer teaches all the limitations discloses in claim 1, however he does not teach placing the one or more eliminated (deleted) columns into a separate table so that the column with a highest cardinality is in the leftmost position, and the column with the lowest cardinality is in the rightmost position.

White teaches optionally eliminating at least one column from the table storing user data and the possibility of reconstructing it later (what means that the eliminated columns have to be stored) (column 50, lines 4-9).

Witkowski teaches ordering columns based on their cardinality (i.e. lowest to the highest) (paragraph 517).

It would have been obvious to one of the ordinary skill in the art during the time the invention was made to store eliminated columns as taught by White and organize them from the highest to the lowest cardinality as indirectly taught by Witkowski (even though Witkowski teaches ordering the columns from the lowest to the highest cardinality, it would have been obvious to order those columns from the highest to the lowest cardinality because it would require mere change in coding and it is simply just a design choice), in the relational database tables as taught by Schiefer because storing eliminated columns for possible future use allows greater flexibility in data organization, furthermore once deleted columns might be useful in the future, or the important columns might be removed by mistake, therefore storing removed data could provide possible back-up.

As to claim 3, Witkowski teaches the method wherein partial key  $K(i)$  comprises a partial key with an index  $i$  (paragraph 3) and a value  $Kri$  (Figure 1, any entry below the indexes) for a tuple  $t(r)$  in row with index  $r$  (Figure 15, element 1501), and wherein the number of distinct values of  $K(i)$  comprises cardinality  $|K(i)|$  (paragraph 591).

As to claim 4, Witkowski teaches the method wherein a table  $T$  comprises  $k$  key figures (Figure 15, elements starting from D2L1-D2L3) and  $d$  partial keys  $K(1), \dots, K(d)$  (Figure 15, elements D1L1-D1L4).

As to claim 5, Witkowski teaches the method wherein a table  $T$  comprises  $n$  tuples and  $d+k$  columns (Figure 15, elements 1502-1 to 1502-5), wherein the  $n$  tuples comprise rows (wherein tuple is considered to be a row extending through at least one column).

As to claim 6, Schiefer teaches the method wherein a function  $F(x) = y$  (it is considered that this function describes equating two partial keys) comprises a mapping between partial keys  $x$  and  $y$  in a same tuple (column 7, lines 31-43, wherein comparing any two rows in different columns also allows to compare two rows in the same tuple).

As to claim 7, Schiefer does not explicitly teach that the Boolean flag, however Witkowski teaches the method wherein certain parameters are set to true prior to executing of the program (paragraph 358). It would have been obvious to one of the ordinary skill in the art during the time the invention was made to use Boolean flag to compare two values, because this comparison method is very well known in the art (the "if" statement is based on Boolean value of true or false).

As to claims 8 and 15, Schiefler teaches the method wherein defining  $F$  from each partial key to every other partial key (wherein the partial key is one entry in the table) to its right in a reordered table for each row in table  $T$  (column 5, lines 47-52, wherein if one row is deleted, the remaining rows have to be reordered/renumbered because otherwise there would be unnecessary gap in the row order, furthermore the function); determining a functional dependency exists when the function  $F(K_{ri}) = K_{rj}$  is the same function for each tuple  $t(r)$  in the table for values of index  $i$  (wherein index represents numbering of columns) from 1 to  $(d-1)$  and for values of  $j$  from  $(i+1)$  to  $d$  (column 7, lines 30-44, wherein if there is only one row in the column, then the functional dependency is checked for each tuple).

As to claim 9, Schiefler teaches the method wherein when a tuple  $t$  is in the table  $T$  and  $F(K_{ri})$  is not equal to  $K_{rj}$ , a functional dependency does not exist between column



l and j (column 7, lines 32-44, wherein if two rows have nothing in common (no common element) then they do not have functional dependency).

As to claim 13, Witkowski teaches the method wherein partial key  $K(i)$  comprises a partial key with an index  $i$  (paragraph 3) and a value  $Kri$  (Figure 1, any entry below the indexes) for a tuple  $t(r)$  in row with index  $r$  (Figure 15, element 1501), and wherein the number of distinct values of  $K(i)$  comprises cardinality  $|K(i)|$  (paragraph 591), wherein the tuple  $t$  comprises  $k$  key figures (Figure 15, elements starting from D2L1-D2L3) and  $d$  partial keys  $K(i)$  for  $i$  from 1 to  $d$  (Figure 15, elements D1L1-D1L4), wherein a table  $T$  comprises  $n$  tuples and  $(d + k)$  columns (Figure 15, elements 1502-1 to 1502-5), wherein the  $n$  tuples comprise rows, and wherein a function  $F(x) = y$  comprises a mapping between partial keys  $x$  and  $y$  in a same tuple (column 7, lines 31-43, wherein comparing any two rows in different columns also allows to compare two rows in the same tuple).

As to claim 14, Schiefler teaches the method the exception list for the pairs of partial keys that are not functionally dependent comprises partial keys pairs that do not fit a functional dependency defined for other tuples in the table (column 9, lines 39-44, wherein the list is the catalog of the columns that were not deleted sine they were not functionally dependent). Schiefler does not explicitly teach the exception list also representing errors with data models, however Witkowski teaches that the errors regarding run time or null contain produce the error. It would have been obvious to one of the ordinary skill in the art during the time the invention was made to also report the

errors because this is common practice, and furthermore it is highly desirable to see possible error at least for the purposes of troubleshooting.

***Allowable Subject Matter***

13. Claims 10, 11 and 16 - 19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims and if the rejections under 35 U.S.C 101 and 112 second paragraph regarding claim 1 would be overcome.

14. The following is a statement of reasons for the indication of allowable subject matter:

As to claim 10, the prior art fails to teach the method as disclosed in all the preceding claims and further wherein determining whether pairs of partial keys are functionally dependent comprises the steps as disclosed in claim 10.

As to claim 11, this claim would be allowable by the virtue of its dependency on claim 10.

As to claim 16, the prior art fails to teach the method as disclosed in all the preceding claims and further wherein upon determining multiple mappings, checking whether one or more entries is set  $Kr_j$  are similar for each  $t(r)$ .

As to claims 17-19, those claims would be allowable by the virtue of their dependency on claim 16.

***The Prior Art***

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- Potapov et al (US Publication 2005/0004936) discloses the fact table storage wherein the data in the table is divided into the segments.
- Colby et al (US Publication 20020077997) discloses the database in the form of table comprising indexes and wherein particular columns are removed if functional dependency is established.

***Inquiry***

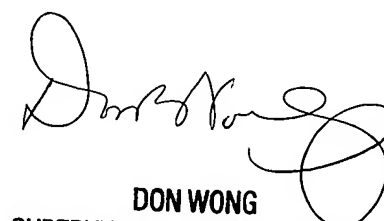
16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Angela M. Lie whose telephone number is 571-272-8445. The examiner can normally be reached on M-F.

17. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Don Wong can be reached on 571-272-1834. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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18. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

**Angela M Lie**



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